AUTHORIZATION TO DISCHARGE UNDER THE
RHODE ISLAND POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of Chapter 46-12 of the Rhode Island General Laws, as amended,

Brown University
164 Angell Street, Box 1914
Providence, RI 02912

is authorized to discharge from a facility located at

Brown University - School of Engineering Buildings
182 Hope Street
Providence, RI 02912

to receiving waters named

Providence River

in accordance with effluent limitations, monitoring requirements and other conditions set forth herein.

This permit shall become effective on _____.

This permit and the authorization to discharge expire at midnight, five (5) years from the effective date.

This permit consists of eight (8) pages in Part I including effluent limitations, monitoring requirements, etc. and ten (10) pages in Part II including General Conditions.

Signed this day of , 2015.

DRAFT

Angelo S. Liberti, PE, Chief of Surface Water Protection
Office of Water Resources
Rhode Island Department of Environmental Management
Providence, Rhode Island

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning on the effective date of this permit and lasting through permit expiration, the permittee is authorized to discharge from outfall serial number 001A. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations					Monitoring Requirement	
	Quantity - lbs./day		Concentration - specify units				
	Average Monthly	Maximum Daily	Average Monthly *(Minimum)	Average Weekly *(Average)	Maximum Daily *(Maximum)	Measurement Frequency	Sample Type
Flow	2.0 gpm	10.0 gpm				Continuous[1]	Recorder
Total Suspended Solids			30 mg/l		--- mg/l	2/Month	Grab
Bis (2-ethylhexyl) phthalate[2]			6 ug/l		6 ug/l	2/Month	Grab

[1] Monitor flow and submit a flow log with the monitoring results. The flow log shall include the rate and duration of flow including the time(s) of day when flow commences and ceases. At a minimum the flow must be reported each time a sample is collected.

[2] After two consecutive reporting periods during which time this effluent characteristic is not detected, at the MDL in Part I.B, the permittee may request that monitoring for this effluent characteristic be ceased. Upon written approval by DEM, monitoring will no longer be required.

--- Signifies a parameter that must be monitored and data must be reported; no limit has been established at this time.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the effluent of the groundwater treatment system which is designated as Outfall 001A. The two (2) grab samples taken per month shall be separated by a minimum of ten (10) days.

2. a. The pH of the effluent shall not be less than 6.5 nor greater than 8.5 standard units at any time, unless these values are exceeded due to natural causes or as a result of the approved treatment processes.

   b. The discharge shall not cause visible discoloration of the receiving waters.

   c. The effluent shall contain neither a visible oil sheen, foam, nor floating solids at any time.

3. All existing manufacturing, commercial, mining, and silvicultural dischargers must notify the Director as soon as they know or have reason to believe:

   a. That any activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

      (1) One hundred micrograms per liter (100 ug/l);

      (2) Two hundred micrograms per liter (200 ug/l) for acrolein and acrylonitrile; five hundred micrograms per liter (500 ug/l) for 2,4-dinitrophenol and for 2-methyl-4,6-dinitro-phenol; and one milligram per liter (1 mg/l) for antimony;

      (3) Five (5) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 C.F.R. s122.21(g)(7); or

      (4) Any other notification level established by the Director in accordance with 40 C.F.R. s122.44(f) and Rhode Island Regulations.

   b. That any activity has occurred or will occur which would result in the discharge, on a non-routine or infrequent basis, of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

      (1) Five hundred micrograms per liter (500 ug/l);

      (2) One milligram per liter (1 mg/l) for antimony;

      (3) Ten (10) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 C.F.R. s122.21(g)(7); or

      (4) Any other notification level established by the Director in accordance with 40 C.F.R. s122.44(f) and Rhode Island Regulations.

   c. That they have begun or expect to begin to use or manufacture as an intermediate or final product or by-product any toxic pollutant, which was not reported in the permit application.

4. Initial Treatment System Discharge Startup – The permittee must perform the following additional sampling and analysis of all applicable parameters during the first month of discharge.

   a. During the first week of discharge, permittees must take laboratory samples from the effluent once each day on the first, third, and sixth day of the discharge.

   b. During the first week, samples must be analyzed in accordance with 40 CFR 136 or by other methods approved by this permit with a 72-hour turnaround time. After the first week, samples may be analyzed with a 7-day turnaround time.

   c. If the treatment system is working properly and achieving effluent limits, sampling for the remainder of the first month shall be weekly (i.e., for weeks 2, 3, and 4) and then at a frequency of twice per month thereafter for the term of the permit. After the first week, results for these additional samples shall be received and reviewed by the operator no more than seven (7) days from the sampling event.

   d. During system startup, the operator may also utilize field monitoring and visual observations as appropriate (e.g. portable organic vapor analysis or other tests) to aid in proper system startup.

   e. If the operator has any indication of a water treatment system malfunction or a violation of effluent limitations, the operator must turn the system off and notify the DEM within 24 hours. If the problem has been corrected, discharge may resume upon completion of the correction of the problems and upon DEM approval of the start up. After the discharge is restarted the operator may resume with the regular sampling schedule per Part I.4.a-d above.

5. In the event that bis (2-ethyl hexyl) thalate is detected in the effluent above the limits listing in Part I.A.1 of the permit, the permittee must immediately cease the discharge. Upon written approval by the DEM the permittee will then be required to upgrade the treatment system prior to resuming the discharge. The upgraded treatment system must include granular activated carbon treatment as outlined in the permit application submitted to the department dated August 6, 2015.

6. The permittee shall at all times properly operate and maintain the groundwater recovery/treatment system. Notification of mechanical failure or breakthrough of the treatment system (exceedance of any permit limits) shall be reported to the Office of Water Resources within one (1) business day of either the mechanical failure or receiving the analytical results indicating the exceedance. If any of the contaminants are found in the effluent (Outfall 001A) above the limits listed in Part I.A.1 the notification shall include a summary of the total flow, operation and maintenance activities, and any recent laboratory results. Written documentation of the notification required above shall be submitted to the Office of Water Resources within five (5) days along with a description of the corrective actions which were taken to resolve the non-compliant status.

7. The permittee shall treat all groundwater pumped at the site using the treatment system described in the RIPDES permit application. The permittee may not modify the treatment system without prior written approval from the Office of Water Resources.

8. The treatment system shall be inspected a minimum of twice per month to assure the system is operating properly. As a result of these or any other inspections, appropriate action shall be taken, as soon as practicable, to resolve any problems discovered during an

inspection. Records documenting inspections and any actions taken shall be retained and made available upon request to the Office of Water Resources.

9. This permit serves as the State's Water Quality Certificate for the discharges described herein.

B. DETECTION LIMITS

The permittee shall assure that all wastewater testing required by this permit, is performed in conformance with the method detection limits listed below. In accordance with 40 CFR Part 136, EPA approved analysis techniques, quality assurance procedures and quality control procedures shall be followed for all reports required to be submitted under the RIPDES program. These procedures are described in "Methods for the Determination of Metals in Environmental Samples" (EPA/600/4-91/010) and "Methods for Chemical Analysis of Water and Wastes" (EPA/600/4-79/020).

The report entitled "Methods for the Determination of Metals in Environmental Samples" includes a test which must be performed in order to determine if matrix interferences are present, and a series of tests to enable reporting of sample results when interferences are identified. Each step of the series of tests becomes increasingly complex, concluding with the complete Method of Standard Additions analysis. The analysis need not continue once a result which meets the applicable quality control requirements has been obtained. Documentation of all steps conducted to identify and account for matrix interferences shall be documented and maintained onsite.

If, after conducting the complete Method of Standard Additions analysis, the laboratory is unable to determine a valid result, the laboratory shall report "could not be analyzed". Documentation supporting this claim shall be maintained onsite. If valid analytical results are repeatedly unobtainable, DEM may require that the permittee determine a method detection limit (MDL) for their effluent or sludge as outlined in 40 CFR Part 136, Appendix B.

When calculating sample averages for reporting on discharge monitoring reports (DMRs):

1. "could not be analyzed" data shall be excluded, and shall not be considered as failure to comply with the permit sampling requirements;

2. results reported as less than the MDL shall be reported in accordance with the DEM's DMR Instructions.

Therefore, all sample results shall be reported as: an actual value, "could not be analyzed", or zero. The effluent or sludge specific MDL must be calculated using the methods outlined in 40 CFR Part 136, Appendix B. Samples which have been diluted to ensure that the sample concentration will be within the linear dynamic range shall not be diluted to the extent that the analyte is not detected. If this should occur the analysis shall be repeated using a lower degree of dilution.

LIST OF TOXIC POLLUTANTS

The following list of toxic pollutants has been designated pursuant to Section 307(a)(1) of the Clean Water Act. The Method Detection Limits (MDLs) represent the required Rhode Island MDLs.

Volatiles - EPA Method 624		MDL ug/l (ppb)
1V	acrolein	10.0
2V	acrylonitrile	5.0
3V	benzene	1.0
5V	bromoform	1.0
6V	carbon tetrachloride	1.0
7V	chlorobenzene	1.0
8V	chlorodibromomethane	1.0
9V	chloroethane	1.0
10V	2-chloroethylvinyl ether	5.0
11V	chloroform	1.0
12V	dichlorobromomethane	1.0
14V	1,1-dichloroethane	1.0
15V	1,2-dichloroethane	1.0
16V	1,1-dichloroethylene	1.0
17V	1,2-dichloropropane	1.0
18V	1,3-dichloropropylene	1.0
19V	ethylbenzene	1.0
20V	methyl bromide	1.0
21V	methyl chloride	1.0
22V	methylene chloride	1.0
23V	1,1,2,2-tetrachloroethane	1.0
24V	tetrachloroethylene	1.0
25V	toluene	1.0
26V	1,2-trans-dichloroethylene	1.0
27V	1,1,1-trichloroethane	1.0
28V	1,1,2-trichloroethane	1.0
29V	trichloroethylene	1.0
31V	vinyl chloride	1.0

Acid Compounds - EPA Method 625		MDL ug/l (ppb)
1A	2-chlorophenol	1.0
2A	2,4-dichlorophenol	1.0
3A	2,4-dimethylphenol	1.0
4A	4,6-dinitro-o-cresol	1.0
5A	2,4-dinitrophenol	2.0
6A	2-nitrophenol	1.0
7A	4-nitrophenol	1.0
8A	p-chloro-m-cresol	2.0
9A	pentachlorophenol	1.0
10A	phenol	1.0
11A	2,4,6-trichlorophenol	1.0

Pesticides - EPA Method 608		MDL ug/l (ppb)
1P	aldrin	0.059
2P	alpha-BHC	0.058
3P	beta-BHC	0.043
4P	gamma-BHC	0.048
5P	delta-BHC	0.034
6P	chlordane	0.211
7P	4,4 ' -DDT	0.251
8P	4,4 ' -DDE	0.049
9P	4,4 ' -DDD	0.139
10P	dieldrin	0.082
11P	alpha-endosulfan	0.031
12P	beta-endosulfan	0.036
13P	endosulfan sulfate	0.109
14P	endrin	0.050
15P	endrin aldehyde	0.062
16P	heptachlor	0.029
17P	heptachlor epoxide	0.040

Pesticides - EPA Method 608		MDL ug/l (ppb)
18P	PCB-1242	0.289
19P	PCB-1254	0.298
20P	PCB-1221	0.723
21P	PCB-1232	0.387
22P	PCB-1248	0.283
23P	PCB-1260	0.222
24P	PCB-1016	0.494
25P	toxaphene	1.670

Base/Neutral - EPA Method 625		MDL ug/l (ppb)
1B	acenaphthene *	1.0
2B	acenaphthylene *	1.0
3B	anthracene *	1.0
4B	benzidine	4.0
5B	benzo(a)anthracene *	2.0
6B	benzo(a)pyrene *	2.0
7B	3,4-benzofluoranthene *	1.0
8B	benzo(ghi)perylene *	2.0
9B	benzo(k)fluoranthene *	2.0
10B	bis(2-chloroethoxy)methane	2.0
11B	bis(2-chloroethyl)ether	1.0
12B	bis(2-chloroisopropyl)ether	1.0
13B	bis(2-ethylhexyl)phthalate	1.0
14B	4-bromophenyl phenyl ether	1.0
15B	butylbenzyl phthalate	1.0
16B	2-chloronaphthalene	1.0
17B	4-chlorophenyl phenyl ether	1.0
18B	chrysene *	1.0
19B	dibenzo (a,h)anthracene *	2.0
20B	1,2-dichlorobenzene	1.0
21B	1,3-dichlorobenzene	1.0
22B	1,4-dichlorobenzene	1.0
23B	3,3 ' -dichlorobenzidine	2.0
24B	diethyl phthalate	1.0
25B	dimethyl phthalate	1.0
26B	di-n-butyl phthalate	1.0
27B	2,4-dinitrotoluene	2.0
28B	2,6-dinitrotoluene	2.0
29B	di-n-octyl phthalate	1.0
30B	1,2-diphenylhydrazine (as azobenzene)	1.0
31B	fluoranthene *	1.0
32B	fluorene *	1.0
33B	hexachlorobenzene	1.0
34B	hexachlorobutadiene	1.0
35B	hexachlorocyclopentadiene	2.0
36B	hexachloroethane	1.0
37B	indeno(1,2,3-cd)pyrene *	2.0
38B	isophorone	1.0
39B	naphthalene *	1.0
40B	nitrobenzene	1.0
41B	N-nitrosodimethylamine	1.0
42B	N-nitrosodi-n-propylamine	1.0
43B	N-nitrosodiphenylamine	1.0
44B	phenanthrene *	1.0
45B	pyrene *	1.0
46B	1,2,4-trichlorobenzene	1.0

OTHER TOXIC POLLUTANTS

	MDL ug/l (ppb)
Antimony, Total	3.0
Arsenic, Total	1.0
Beryllium, Total	0.2
Cadmium, Total	0.1
Chromium, Total	1.0
Chromium, Hexavalent	20.0
Copper, Total	1.0
Lead, Total	1.0
Mercury, Total	0.2
Nickel, Total	1.0
Selenium, Total	2.0
Silver, Total	0.5
Thallium, Total	1.0
Zinc, Total	5.0
Asbestos	**
Cyanide, Total	10.0
Phenols, Total	50.0
TCDD	**
MTBE (Methyl Tertiary Butyl Ether)	1.0
Turbidity	0.2 NTU
Fecal Coliform	2.0 MPN/100 ml
Total Suspended Solids	5.0 mg/l
Oil and Grease	2.0 mg/l

** No Rhode Island Department of Environmental Management (RIDEM) MDL

NOTE:

The MDL for a given analyte may vary with the type of sample. MDLs which are determined in reagent water may be lower than those determined in wastewater due to fewer matrix interferences. Wastewater is variable in composition and may therefore contain substances (interferents) that could affect MDLs for some analytes of interest. Variability in instrument performance can also lead to inconsistencies in determinations of MDLs.

To help verify the absence of matrix or chemical interference the analyst is required to complete specific quality control procedures. For the metals analyses listed above the analyst must withdraw from the sample two equal aliquots; to one aliquot add a known amount of analyte, and then dilute both to the same volume and analyze. The unspiked aliquot multiplied by the dilution factor should be compared to the original. Agreement of the results within 10% indicates the absence of interference. Comparison of the actual signal from the spiked aliquot to the expected response from the analyte in an aqueous standard should help confirm the finding from the dilution analysis. (Methods for Chemical Analysis of Water and Wastes EPA-600/4-79/020).

For Methods 624 and 625 the laboratory must on an ongoing basis, spike at least 5% of the samples from each sample site being monitored. For laboratories analyzing 1 to 20 samples per month, at least one spiked sample per month is required. For laboratories analyzing 1 to 20 samples per month, at least one spiked sample per month is required. The spike should be at the discharge permit limit or 1 to 5 times higher than the background concentration, whichever concentration would be larger. (40 CFR Part 136 Appendix B Method 624 and 625 subparts 8.3.1 and 8.3.11).

C. MONITORING AND REPORTING

1. Monitoring

All monitoring required by this permit shall be done in accordance with sampling and analytical testing procedures specified in Federal Regulations (40 CFR Part 136) or the following alternative methods:

a. For measuring volatile compounds, Method 8260C (or most recent version) may be used as a substitute for CWA Methods 524.2, 602, 624, or 1624.

b. For measuring semivolatile compounds, Method 8270D (or the most recent version) may be used as a substitute for Methods 610, 625, and 1625.

c. Any use of Method 8260C or Method 8270D must be accompanied by documented quality assurance/quality control (QA/QC) test results to prove that the analytical process can achieve the lower detection limits of the alternative methods.

2. Reporting

Monitoring results obtained during the previous quarter shall be summarized and reported on Discharge Monitoring Report (DMR) Forms, postmarked no later than the 15th day of the month following the completed quarter as follows:

Quarter Testing to be Performed	Report Due No Later Than	Results Submitted on DMR for
January 1 – March 31	April 15	January 1 – March 31
April 1- June 30	July 15	April 1 - June 30
July 1 – September 30	October 15	July 1 – September 30
October 1 – December 31	January 15	October 1 – December 31

The first report is due on _____.

Signed copies of these, and all other reports required herein, shall be submitted to:

RIPDES Program
Rhode Island Department of Environmental Management
235 Promenade Street
Providence, Rhode Island 02908

PART II
TABLE OF CONTENTS

GENERAL REQUIREMENTS

DEFINITIONS

GENERAL REQUIREMENTS

(a) Duty to Comply

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of Chapter 46-12 of the Rhode Island General Laws and the Clean Water Act (CWA) and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application.

(1) The permittee shall comply with effluent standards or prohibitions established under Section 307(a) of the CWA for toxic pollutants within the time provided in the regulations that establish these standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.

(2) The CWA provides that any person who violates a permit condition implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the CWA is subject to a civil penalty not to exceed $10,000 per day of such violation. Any person who willfully or negligently violates permit conditions implementing Sections 301, 302, 306, 307 or 308 of the Act is subject to a fine of not less than $2,500 nor more than $25,000 per day of violation, or by imprisonment of not more than 1 year, or both.

(3) Chapter 46-12 of the Rhode Island General Laws provides that any person who violates a permit condition is subject to a civil penalty of not more than $5,000 per day of such violation. Any person who willfully or negligently violates a permit condition is subject to a criminal penalty of not more than $10,000 per day of such violation and imprisonment for not more than 30 days, or both. Any person who knowingly makes any false statement in connection with the permit is subject to a criminal penalty of not more than $5,000 for each instance of violation or by imprisonment for not more than 30 days, or both.

(b) Duty to Reapply

If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit. The permittee shall submit a new application at least 180 days before the expiration date of the existing permit, unless permission for a later date has been granted by the Director. (The Director shall not grant permission for applications to be submitted later than the expiration date of the existing permit.)

(c) Need to Halt or Reduce Not a Defense

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

(d) Duty to Mitigate

The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

(e) Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures, and, where applicable, compliance with DEM "Rules and Regulations Pertaining to the Operation and Maintenance of Wastewater Treatment Facilities" and "Rules and Regulations Pertaining to the Disposal and Utilization of Wastewater Treatment Facility Sludge." This provision requires the operation of back-up or auxiliary facilities or similar systems only when the operation is necessary to achieve compliance with the conditions of the permit.

(f) Permit Actions

This permit may be modified, revoked and reissued, or terminated for cause, including but not limited to: (1) Violation of any terms or conditions of this permit; (2) Obtaining this permit by misrepresentation or failure to disclose all relevant facts; or (3) A change in any conditions that requires either a temporary or permanent reduction or elimination of the authorized discharge. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

(g) Property Rights

This permit does not convey any property rights of any sort, or any exclusive privilege.

(h) Duty to Provide Information

The permittee shall furnish to the Director, within a reasonable time, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Director, upon request, copies of records required to be kept by this permit.

(i) Inspection and Entry

The permittee shall allow the Director, or an authorized representative, upon the presentation of credentials and other documents as may be required by law, to:

(1) Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

(2) Have access to and copy, at reasonable times any records that must be kept under the conditions of this permit;

(3) Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices or operations regulated or required under this permit; and

(4) Sample or monitor any substances or parameters at any location, at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the CWA or Rhode Island law.

(j) Monitoring and Records

(1) Samples and measurements taken for the purpose of monitoring shall be representative of the volume and nature of the discharge over the sampling and reporting period.

(2) The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings from continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 5 years from the date of the sample, measurement, report or application. This period may be extended by request of the Director at any time.

(3) Records of monitoring information shall include:

(i) The date, exact place, and time of sampling or measurements;

(ii) The individual(s) who performed the sampling or measurements;

(iii) The date(s) analyses were performed;

(iv) The individual(s) who performed the analyses;

(v) The analytical techniques or methods used; and

(vi) The results of such analyses.

(4) Monitoring must be conducted according to test procedures approved under 40 CFR Part 136 and applicable Rhode Island regulations, unless other test procedures have been specified in this permit.

(5) The CWA provides that any person who falsifies, tampers with, or knowingly renders inaccurate, any monitoring device or method required to be maintained under this permit shall upon conviction, be punished by a fine of not more than $10,000 per violation or by imprisonment for not more than 6 months per violation or by both. Chapter 46-12 of the Rhode Island General Laws also provides that such acts are subject to a fine of not more than $5,000 per violation, or by imprisonment for not more than 30 days per violation, or by both.

(6) Monitoring results must be reported on a Discharge Monitoring Report (DMR).

(7) If the permittee monitors any pollutant more frequently than required by the permit, using test procedures approved under 40 CFR Part 136, applicable State regulations, or as specified in the permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR.

(k) Signatory Requirement

All applications, reports, or information submitted to the Director shall be signed and certified in accordance with Rule 12 of the Rhode Island Pollutant Discharge Elimination System (RIPDES) Regulations. Rhode Island General Laws, Chapter 46-12 provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance shall, upon conviction, be punished by a fine of not more than $5,000 per violation, or by imprisonment for not more than 30 days per violation, or by both.

(l) Reporting Requirements

(1) Planned changes. The permittee shall give notice to the Director as soon as possible of any planned physical alterations or additions to the permitted facility.

(2) Anticipated noncompliance. The permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity which may result in noncompliance with the permit requirements.

(3) Transfers. This permit is not transferable to any person except after written notice to the Director. The Director may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under State and Federal law.

(4) Monitoring reports. Monitoring results shall be reported at the intervals specified elsewhere in this permit.

(5) Twenty-four hour reporting. The permittee shall immediately report any noncompliance which may endanger health or the environment by calling DEM at (401) 222-4700 or (401) 222-3070 at night.

A written submission shall also be provided within five (5) days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

The following information must be reported immediately:

(i) Any unanticipated bypass which causes a violation of any effluent limitation in the permit; or

(ii) Any upset which causes a violation of any effluent limitation in the permit; or

(iii) Any violation of a maximum daily discharge limitation for any of the pollutants specifically listed by the Director in the permit.

The Director may waive the written report on a case-by-case basis if the oral report has been received within 24 hours.

(6) Other noncompliance. The permittee shall report all instances of noncompliance not reported under paragraphs (1), (2), and (5), of this section, at the time monitoring reports are submitted. The reports shall contain the information required in paragraph (l)(5) of the section.

(7) Other information. Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Director, they shall promptly submit such facts or information.

(m) Bypass

"Bypass" means the intentional diversion of waste streams from any portion of a treatment facility.

(1) Bypass not exceeding limitations. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs (2) and (3) of this section.

(2) Notice.

(i) Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least ten (10) days before the date of the bypass.

(ii) Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in Rule 14.18 of the RIPDES Regulations.

(3) Prohibition of bypass.

(i) Bypass is prohibited, and the Director may take enforcement action against a permittee for bypass, unless:

(A) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage, where "severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production;

(B) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate backup equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

(C) The permittee submitted notices as required under paragraph (2) of this section.

(ii) The Director may approve an anticipated bypass, after considering its adverse effects, if the Director determines that it will meet the three conditions listed above in paragraph (3)(i) of this section.

(n) Upset

"Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

(1) Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of paragraph (2) of this section are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

(2) Conditions necessary for a demonstration of upset. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

(a) An upset occurred and that the permittee can identify the cause(s) of the upset;

(b) The permitted facility was at the time being properly operated;

(c) The permittee submitted notice of the upset as required in Rule 14.18 of the RIPDES Regulations; and

(d) The permittee complied with any remedial measures required under Rule 14.05 of the RIPDES Regulations.

(3) Burden of proof. In any enforcement proceeding the permittee seeking to establish the occurrence of an upset has the burden of proof.

(o) Change in Discharge

All discharges authorized herein shall be consistent with the terms and conditions of this permit. Discharges which cause a violation of water quality standards are prohibited. The discharge of any pollutant identified in this permit more frequently than or at a level in excess of that authorized shall constitute a violation of the permit. Any anticipated facility expansions, production increases, or process modifications which will result in new, different or increased discharges of pollutants must be reported by submission of a new NPDES application at least 180 days prior to commencement of such discharges, or if such changes will not violate the effluent limitations specified in this permit, by notice, in writing, to the Director of such changes. Following such notice, the permit may be modified to specify and limit any pollutants not previously limited.

Until such modification is effective, any new or increased discharge in excess of permit limits or not specifically authorized by the permit constitutes a violation.

(p) Removed Substances

Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in a manner consistent with applicable Federal and State laws and regulations including, but not limited to the CWA and the Federal Resource Conservation and Recovery Act, 42 U.S.C. §§6901 et seq., Rhode Island General Laws, Chapters 46-12, 23-19.1 and regulations promulgated thereunder.

(q) Power Failures

In order to maintain compliance with the effluent limitation and prohibitions of this permit, the permittee shall either:

> In accordance with the Schedule of Compliance contained in Part I, provide an alternative power source sufficient to operate the wastewater control facilities;

or if such alternative power source is not in existence, and no date for its implementation appears in Part I,

> Halt reduce or otherwise control production and/or all discharges upon the reduction, loss, or failure of the primary source of power to the wastewater control facilities.

(r) Availability of Reports

Except for data determined to be confidential under paragraph (w) below, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the DEM, 291 Promenade Street, Providence, Rhode Island. As required by the CWA, effluent data shall not be considered confidential. Knowingly making any false statement on any such report may result in the imposition of criminal penalties as provided for in Section 309 of the CWA and under Section 46-12-14 of the Rhode Island General Laws.

(s) State Laws

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law.

(t) Other Laws

The issuance of a permit does not authorize any injury to persons or property or invasion of other private rights, nor does it relieve the permittee of its obligation to comply with any other applicable Federal, State, and local laws and regulations.

(u) Severability

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

(v) Reopener Clause

The Director reserves the right to make appropriate revisions to this permit in order to incorporate any appropriate effluent limitations, schedules of compliance, or other provisions which may be authorized under the CWA or State law. In accordance with Rules 15 and 23 of the RIPDES Regulations, if any effluent standard or prohibition, or water quality standard is promulgated under the CWA or under State law which is more stringent than any limitation on the pollutant in the permit, or controls a pollutant not limited in the permit, then the Director may promptly reopen the permit and modify or revoke and reissue the permit to conform to the applicable standard.

(w) Confidentiality of Information

(1) Any information submitted to DEM pursuant to these regulations may be claimed as confidential by the submitter. Any such claim must be asserted at the time of submission in the manner prescribed on the application form or instructions or, in the case of other submissions, by stamping the words "confidential business information" on each page containing such information. If no claim is made at the time of submission, DEM may make the information available to the pubic without further notice.

(2) Claims of confidentiality for the following information will be denied:

(i) The name and address of any permit applicant or permittee;

(ii) Permit applications, permits and any attachments thereto; and

(iii) NPDES effluent data.

(x) Best Management Practices

The permittee shall adopt Best Management Practices (BMP) to control or abate the discharge of toxic pollutants and hazardous substances associated with or ancillary to the industrial manufacturing or treatment process and the Director may request the submission of a BMP plan where the Director determines that a permittee's practices may contribute significant amounts of such pollutants to waters of the State.

(y) Right of Appeal

Within thirty (30) days of receipt of notice of a final permit decision, the permittee or any interested person may submit a request to the Director for an adjudicatory hearing to reconsider or contest that decision. The request for a hearing must conform to the requirements of Rule 49 of the RIPDES Regulations.

DEFINITIONS

1. For purposes of this permit, those definitions contained in the RIPDES Regulations and the Rhode Island Pretreatment Regulations shall apply.

2. The following abbreviations, when used, are defined below.

cu. M/day or M^3/day	cubic meters per day
mg/l	milligrams per liter
ug/l	micrograms per liter
lbs/day	pounds per day
kg/day	kilograms per day
Temp. °C	temperature in degrees Centigrade
Temp. °F	temperature in degrees Fahrenheit
Turb.	turbidity measured by the Nephelometric Method (NTU)
TNFR or TSS	total nonfilterable residue or total suspended solids
DO	dissolved oxygen
BOD	five-day biochemical oxygen demand unless otherwise specified
TKN	total Kjeldahl nitrogen as nitrogen
Total N	total nitrogen
NH_3-N	ammonia nitrogen as nitrogen
Total P	total phosphorus
COD	chemical oxygen demand
TOC	total organic carbon
Surfactant	surface-active agent
pH	a measure of the hydrogen ion concentration
PCB	polychlorinated biphenyl
CFS	cubic feet per second
MGD	million gallons per day
Oil & Grease	Freon extractable material
Total Coliform	total coliform bacteria
Fecal Coliform	total fecal coliform bacteria
ml/l	milliliter(s) per liter
NO_3-N	nitrate nitrogen as nitrogen
NO_2-N	nitrite nitrogen as nitrogen
NO_3-NO_2	combined nitrate and nitrite nitrogen as nitrogen
$C1_2$	total residual chlorine

RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF WATER RESOURCES
235 PROMENADE STREET
PROVIDENCE, RHODE ISLAND 02908

STATEMENT OF BASIS

RHODE ISLAND POLLUTANT DISCHARGE ELIMINATION SYSTEM (RIPDES) PERMIT TO DISCHARGE TO WATERS OF THE STATE

RIPDES PERMIT NO. **RI0023957**

NAME AND ADDRESS OF APPLICANT:

Brown University
164 Angell Street, Box 1914
Providence, RI 02912

NAME AND ADDRESS OF FACILITY WHERE DISCHARGE OCCURS:

Brown University - School of Engineering Buildings
182 Hope Street
Providence, RI 02912

RECEIVING WATER: **Providence River**

CLASSIFICATION: **SB1{a}**

I. **Proposed Action, Type of Facility, and Discharge Location**

The above named applicant has applied to the Rhode Island Department of Environmental Management (DEM) for issuance of a RIPDES Permit to discharge into the designated receiving water. The purpose of this permit is to authorize Brown University to treat and discharge contaminated groundwater from construction dewatering activities and, at a later date, the foundation drainage system for the School of Engineering addition located at 182 Hope Street in Providence, Rhode Island to the stormwater drainage system on Brook Street in Providence. This public drainage piping connects to other lines that ultimately discharge stormwater into the Providence River.

Receiving Water

The proposed discharge is to the Providence River which is designated in the RI Water Quality Regulations as water body identification number RI0007020E-01B. This segment of the Providence River extends from its confluence with the Moshassuck and Woonasquatucket Rivers in Providence south and south of a line from India Point to Bold Point (across the mouth of the Seekonk River), to a line extending from a point on shore due east of Naushon Avenue in Warwick to the western terminus of beach Road in East Providence, including Watchemoket Cove. This particular segment is classified as an SB1{a} water body. These waters are designated for primary and secondary contact recreational activities and fish and wildlife habitat. They shall be suitable for aquacultural uses, navigation, and industrial cooling. These waters shall have good aesthetic value. Primary contact recreational activities may be impacted due to pathogens from approved wastewater discharges. These waters will likely be impacted by combined sewer overflows in accordance with approved CSO Facilities Plans and in compliance with rule 19.E.1 of the RI Water Quality Regulations and the Rhode Island CSO Policy. Therefore, primary contact recreational activities, shellfishing uses; and fish and wildlife habitat will likely be restricted.

The attainment of the Clean Water Act goals is measured by determining how well waters support their designated uses. According to the 2014 303(d) List of Impaired Waters this segment of the Providence River is listed as not supporting the fish and wildlife habitat use due to Total Nitrogen and Dissolved Oxygen impairments. In addition, this waterbody segment is not supporting primary and secondary contact recreational uses due to impairments associated with Fecal Coliform. *Attachment A* contains a Locus Plan which identifies the location of the groundwater treatment

system and the location where the discharge enters the Providence River.

II. Limitations and Conditions

The effluent limitations of the permit, the monitoring requirements, and any implementation schedule (if required) may be found in the draft permit.

III. Permit Basis and Explanation of Effluent Limitation Derivation

Brown University plans to complete an addition to the School of Engineering building which will consist of an approximately 80,000 gross square-foot, four story building located adjacent to the existing Barus & Holley and Prince Engineering Laboratory complex. The building will include a basement level clean room laboratory facility. The site for the new building will be located at the intersection of Manning and Brook Streets on the west side of the existing Barus & Holley building and the south side of the Prince Engineering Laboratory.

The building construction will require construction dewatering in limited areas and the elevation and layout of the basement for the School of Engineering will require long-term groundwater dewatering during periods of the year. The estimated groundwater flow rate during construction dewatering is about two (2) gallons per minute (gpm). However, in order to handle increased flow rates during and after rain events, the dewatering pumps and sediment treatment system has been designed to handle short duration flows of up to 10 gpm. The long term dewatering groundwater flow rates from the underdrainage system, after the building is constructed, are estimated to be approximately one (1) gpm (or less).

Groundwater Treatment System

The proposed treatment system includes a three compartment Weir tank that will be utilized to provide a chamber for aeration, if needed followed by settling and an overflow compartment. The overflow from the tank will be discharged through 5-micron filters for removal of any remaining suspended solids and then discharge to the stormwater system. As a contingency, if future monitoring of Bis (2-ethyl hexyl) phthalate demonstrates any exceedances of discharge limits, the discharge will be stopped and two 200lb granular activate carbon (GAC) adsorbers will be added to the treatment system train. Upon DEM notification and approval the system will be restarted and the discharge may resume. The treatment system has been designed hydraulically for an average flow rate of 2.0 gpm, with the capabilities to accommodate a maximum flow rate of 10 gpm. The future basement collection tank will be sized to allow for management of short duration flows that may exceed 5 gpm. No long-term treatment system is proposed for the discharge from the foundation dewatering system as it is anticipated that all permit limits will be met without treatment once construction is complete. *Attachment B* contains a line drawing which identifies the treatment system components associated with the treatment system proposed in the RIPDES Individual Permit Application dated August 6, 2015.

General Requirements

Development of RIPDES permit limitations is a multi-step process consisting of the following steps: identifying applicable technology-based limits; calculating allowable water-quality based discharge levels based on in-stream criteria, background data and available dilution; establishing Best Professional Judgment (BPJ) limits in accordance with Section 402 of the CWA; and assigning the most stringent as the final discharge limitations.

Water quality criteria are comprised of numeric and narrative criteria. Numeric criteria are scientifically derived ambient concentrations developed by EPA or States for various pollutants of concern to protect human health and aquatic life. Narrative criteria are statements that describe the desired water quality goal. A technology-based limit is a numeric limit, which is determined by examining the capability of a treatment process to reduce or eliminate pollutants.

Water Quality Based Permit Limitations

Appendix B of the Water Quality Regulations describes the flows used to determine compliance with the aquatic life criteria, specifying that the design flow to be utilized for aquatic life criteria shall not be

exceeded at or above the lowest average seven (7) consecutive day low flow with an average recurrence frequency of once in ten (10) years (7Q10).

Two major river systems, the Seekonk River and the Providence River, discharge and mix in the area of the storm water outlet which is the ultimate discharge location for Brown University's groundwater treatment system. To conservatively estimate the minimum dilution available at the point of discharge only a portion of the river flows were considered. Only the 7Q10 flow from the Blackstone River that feeds into the Seekonk River was considered. The 7Q10 flow of the Blackstone River in Woonsocket is 102.25 cubic feet per second (cfs). To arrive at a conservative (minimum) estimate of the dilution at the outfall, DEM assumed that only a fraction of the river flow moves by the near shore area adjacent to the point of discharge. If we assume that the discharge mixes only with 5% of the net 7Q10 river flow for the Blackstone River, the 2.0 gpm average site discharge would mix with 5cfs or 2,224 gpm of /river flow. Thus the discharge would be diluted by a factor of approximately 1,000 times.

Allowable water quality based effluent limitations were established based on the Class SB1{a} saltwater acute and chronic aquatic life criteria and human health criteria specified in Appendix B of the Rhode Island Water Quality Regulations, using 80% allocation when no background data is available and 90% allocation when background data is available. There is no background data available, therefore, the allowable water quality-based discharge levels were calculated as follows:

$$Limit_1 = (Dilution\ Factor)^* (WQ\ Criteria)^*(80\%)$$

In accordance with 40 CFR 122.44(d)(1)(iii), water quality based effluent limitations are only required for those pollutants in the discharge that have the reasonable potential to cause or contribute to the exceedence of in-stream criteria. In order to evaluate the need for permit limits, the allowable monthly average (chronic) and allowable maximum daily (acute) discharge concentrations were compared to highest values detected during groundwater monitoring of wells GZ-101, GZ-105, and GZ-110.

The groundwater at the site was found to contain low levels of Arsenic, Chromium III, Chromium VI, Copper, Lead, Nickel, Selenium, Silver, Zinc, Iron, and Total Cyanide. However, the concentration of these pollutants in the influent is low enough such that there is no reasonable potential for the discharge to exceed the applicable permit limits for these pollutants. In the case of Iron, a water quality standard does not exist for this parameter in the water quality regulations for discharges to salt waters. Based on the DEM's review of the influent data permit limitations for each of these constituents is not required and as a result have not been applied in this permit. A comparison of the groundwater influent data versus applicable permit limitations for all parameters evaluated can be found in *Attachment C.*

Technology Based Permit Limitations

DEM is required to consider technology and water quality requirements when developing permit effluent limits. Technology based treatment requirements represent the minimum level of control that must be imposed under Section 402 and 301(b) of the Act (see 40 CFR 125 Subpart A) to meet Best Practicable Control Technology Currently Available (BPT), Best Conventional Control Technology (BCT) for conventional pollutants, and Best Available Technology Economically Achievable (BAT) for toxic pollutants. In the absence of technology based guidelines, DEM is authorized to use Best Professional Judgment (BPJ) to establish effluent limitations, in accordance with Section 402(a)(1) of the CWA. Since the Environmental Protection Agency has not promulgated technology-based standards for this discharge, DEM developed BPJ limits.

Best Professional Judgment Limitations

Limitations consistent with the RIPDES Remediation General Permit have been included in the permit for Total Suspended Solids (TSS) and Bis(2-ethylhexyl) phthalate. The highest TSS concentration detected during groundwater monitoring was 2,200 mg/l and for Bis(2-ethylhexyl) phthalate it was 4.6 ug/l. Because there is reasonable potential for the discharge to exceed the TSS permit limitation of 30 mg/l treatment will be required for this parameter. Monitoring and limitations for Bis(2-ethylhexyl) phthalate will be applied due to the fact that the limit is 6 ug/l. A condition has been included in the permit that in the event that Bis (2-ethyl hexyl) phthalate is detected in the effluent above the 6 ug/l monthly average and daily maximum limits in the permit, the permittee must

immediately cease the discharge. Upon written approval by the DEM the permittee will then be required to upgrade the treatment system prior to resuming the discharge. The upgraded treatment system must include granular activated carbon treatment as outlined in the permit application submitted to the department dated August 6, 2015. Granular activated carbon technology is proven to be able to remove VOCs and CVOCs to low levels when operated properly. Absent any permit limit exceedances of Bis(2-ethylhexyl) phthalate the treatment system will consist of settling and filtration to address TSS as described above.

The requirements set forth in this permit are from the State's Water Quality Regulations and the State's Regulations for the Rhode Island Pollutant Discharge Elimination System, both filed pursuant to RIGL Chapter 46-12, as amended. DEM's primary authority over the permit comes from EPA's delegation of the program in September 1984 under the Federal Clean Water Act.

The effluent monitoring requirements have been specified in accordance with RIPDES regulations as well as 40 CFR 122.41 (j), 122.44 (l), and 122.48 to yield data representative of the discharge.

The remaining general and specific conditions of the permit are based on the RIPDES regulations as well as 40 CFR Parts 122 through 125 and consist primarily of management requirements common to all permits.

IV. Comment Period, Hearing Requests, and Procedures for Final Decisions

All persons, including applicants, who believe any condition of the draft permit is inappropriate must raise all issues and submit all available arguments and all supporting material for their arguments in full by close of the public comment period, to the Rhode Island Department of Environmental Management, Office of Water Resources, 235 Promenade Street, Providence, Rhode Island, 02908-5767. Any person, prior to such date, may submit a request in writing for a public hearing to consider the draft permit to the Rhode Island Department of Environmental Management. Such requests shall state the nature of the issues proposed to be raised in the hearing. A public hearing may be held after at least thirty (30) days public notice whenever the Director finds that the response to this notice indicates significant public interest. In reaching a final decision on the draft permit the Director will respond to all significant comments and make these responses available to the public at DEM's Providence Office.

Following the close of the comment period, and after a public hearing, if such hearing is held, the Director will issue a final permit decision and forward a copy of the final decision to the applicant and each person who has submitted written comments or requested notice. Within thirty (30) days following the notice of the final permit decision any interested person may submit a request for a formal hearing to reconsider or contest the final decision. Requests for formal hearings must satisfy the requirements of Rule 49 of the Regulations for the Rhode Island Pollutant Discharge Elimination System.

V. DEM Contact

Additional information concerning the permit may be obtained between the hours of 8:30 a.m. and 4:00 p.m., Monday through Friday, excluding holidays, from:

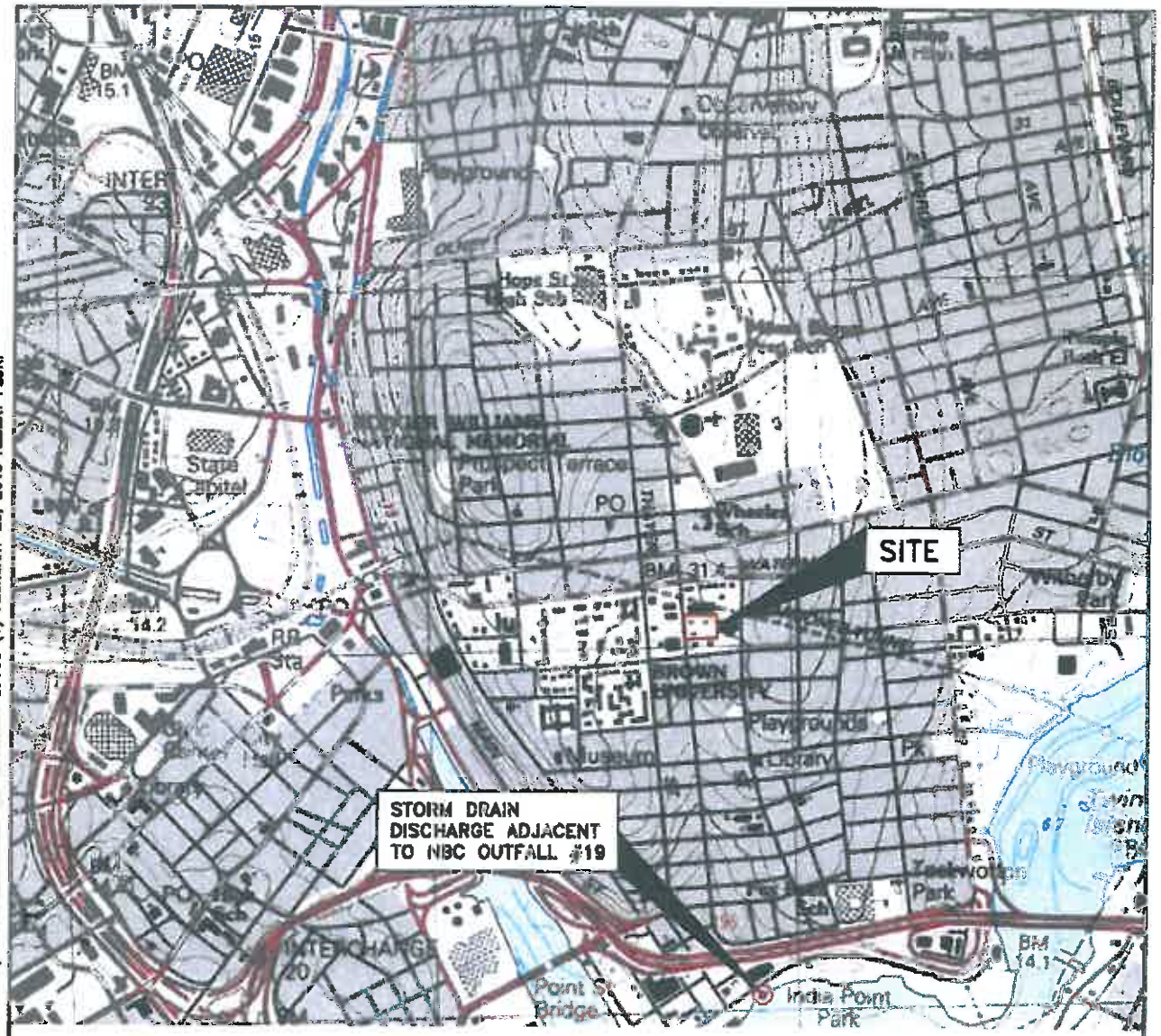
Brian Lafaille, PE
RIPDES Program
Office of Water Resources
Department of Environmental Management
235 Promenade Street
Providence, Rhode Island 02908
Telephone: (401) 222-4700, extension 7715

9/3/15
Date

Joseph B. Haberek, PE
Principal Sanitary Engineer
RIPDES Permitting Section
Department of Environmental Management

Attachment A

Locus Plan



APPROXIMATE SCALE IN FEET

0' 1000' 2000' 4000'

RHODE ISLAND

QUADRANGLE LOCATION

SOURCE:

BASE MAP FROM THE FOLLOWING USGS QUADRANGLE MAP:
PROVIDENCE, RHODE ISLAND–MASSACHUSETTS (1987)

DIGITAL TOPOGRAPHIC MAPS PROVIDED BY MAPTECH, INC.

CONTOUR ELEVATIONS REFERENCE NGVD 29,
CONTOURS ARE SHOWN IN METERS AT 3 METER INTERVALS

BROWN UNIVERSITY
SCHOOL OF ENGINEERING
PROVIDENCE, RHODE ISLAND

PREPARED BY:
GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

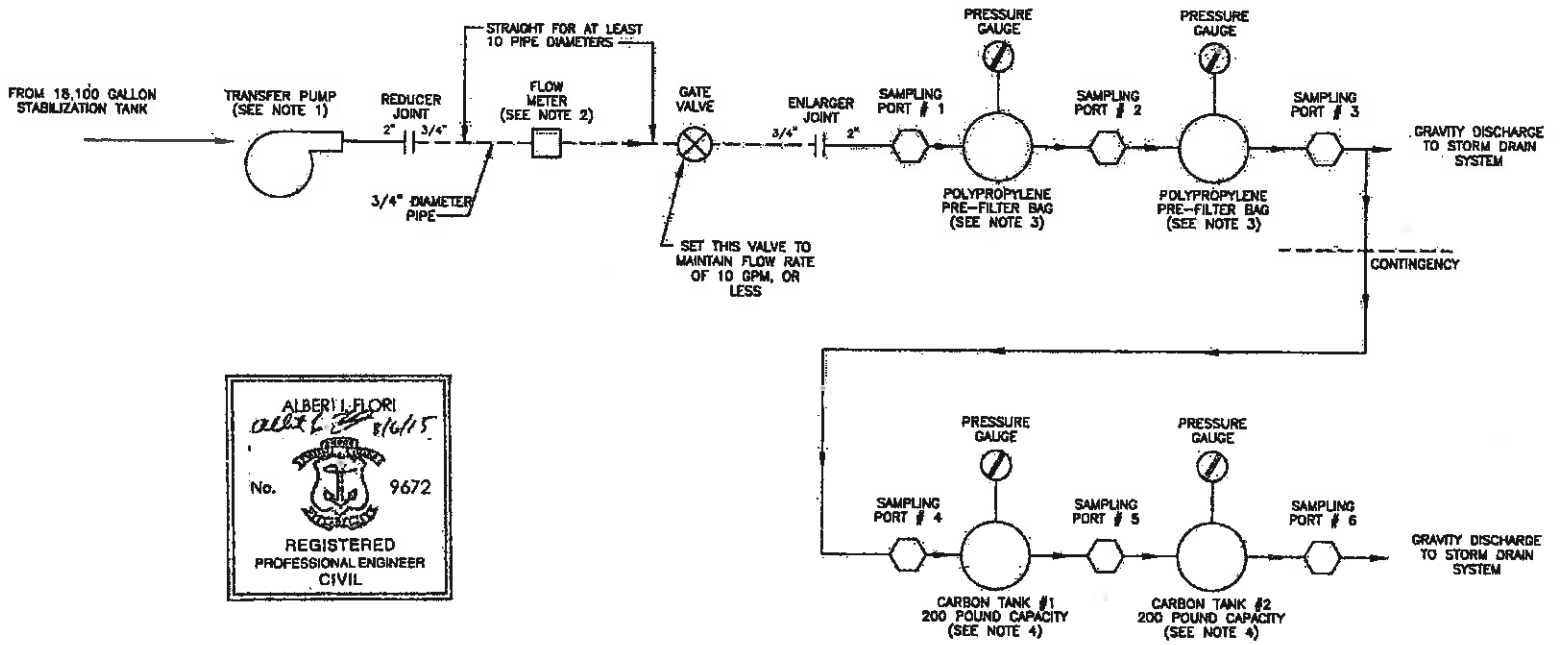
PREPARED FOR:
BROWN UNIVERSITY

LOCUS MAP

PROJ MGR: DLD	REVIEWED BY: DRC	CHECKED BY: TJB	FIGURE 1
DESIGNED BY: TJB	DRAWN BY: CRB	SCALE: AS NOTED	
DATE: JUNE 2015	PROJECT NO. 34017.04	REVISION NO. 0	SHEET NO. 1 OF 2

Attachment B

Brown University - School of Engineering
Construction Dewatering Treatment System Diagram



ALBERT I. FLORI
8/6/15
No. 9672
REGISTERED PROFESSIONAL ENGINEER
CIVIL

NOTES:

1. TRANSFER PUMP
   - 10 GPM FLOW RATE AT HEAD OF 100 FEET
2. FLOW METER
   - UNITS IN GALLONS
   - TOTALIZER UP TO 1,000,000 GALLONS
   - 3/4-INCH DIAMETER INFLOW AND OUTFLOW
3. POLYPROPYLENE PRE-FILTER BAG
   - FILTER SIZE – 5 MICRON
   - PRESSURE GAUGE CAPACITY – 50 PSI
   - DESIGN FLOW RATE ≥ 10 GPM
4. CARBON TANKS (CONTINGENCY)
   - LIQUID PHASE ACTIVATED CARBON ADSORBERS
   - PRESSURE GAUGE CAPACITY – 10 PSI
   - DESIGN FLOW RATE ≤ 10 GPM
5. GENERAL
   - MUST CONFORM TO STATE AND LOCAL BUILDING, PLUMBING AND ELECTRICAL REQUIREMENTS
   - PLACE TREATMENT SYSTEM IN HEATED SHED (OR USE HEAT TAPE) TO PREVENT SYSTEM FROM FREEZING

PROJ. MGR: DESIGNED BY: REVIEWED BY: | OPERATOR: AJF AJF AJS | DATE:AUG 2015

GZA GeoEnvironmental, Inc.

NOT TO SCALE

BROWN UNIVERSITY
SCHOOL OF ENGINEERING
PROVIDENCE, RHODE ISLAND

LINE DIAGRAM OF CONSTRUCTION DEWATERING TREATMENT SYSTEM

JOB NO. 34017.04

FIGURE NO. D1

GZA DRAWING PATH – J:\ENV\34017.04\cmd\Figures\GZA-DWGS\34017.04 – Line Diagram – 182 Hope Street [TEMP TREATMENT SYS] Last Modified: Aug 06, 2015 – 2:36pm Plotted on: Aug 06, 2015 – 2:36pm by albert.flori

Attachment C

CALCULATION OF WATER QUALITY BASED SALTWATER DISCHARGE LIMITS
FACILITY SPECIFIC DATA INPUT SHEET

NOTE: LIMITS BASED ON RI WATER QUALITY CRITERIA DATED JULY 2006

FACILITY NAME: **Brown University - S.O.E.**

RIPDES PERMIT #: **RI0023957**

	DISSOLVED BACKGROUND DATA (ug/L)	ACUTE METAL TRANSLATOR	CHRONIC METAL TRANSLATOR
ALUMINUM	NA	NA	NA
ARSENIC	NA	1	1
CADMIUM	NA	0.994	0.994
CHROMIUM III	NA	NA	NA
CHROMIUM VI	NA	0.993	0.993
COPPER	NA	0.83	0.83
LEAD	NA	0.951	0.951
MERCURY	NA	0.85	NA
NICKEL	NA	0.99	0.99
SELENIUM	NA	0.998	0.998
SILVER	NA	0.85	0.85
ZINC	NA	0.946	0.946

USE NA WHEN NO DATA IS AVAILABLE

NOTE 1: BACKGROUND DATA BASED ON AVERAGE CONCENTRATIONS IN ATTACHMENT B.

NOTE 2: METAL TRANSLATORS FROM RI WATER QUALITY REGS.

DILUTION FACTORS		
	ACUTE =	1000 x
	CHRONIC =	1000 x
	HUMAN HEALTH =	1000 x

NOTE: TEST WWTF'S DILUTION FACTORS OBTAINED FROM A DYE STUDY.

TOTAL AMMONIA CRITERIA (ug/L)		
WINTER	ACUTE =	6000
	CHRONIC =	900
SUMMER	ACUTE =	4600
	CHRONIC =	690

NOTE 1: LIMITS ARE FROM TABLE 3 IN THE RI WATER QUALITY REGS.
USING:
SALINITY = 30 g/Kg
WINTER (NOV-APRIL) pH=8.4 s.u.;
SUMMER (MAY-OCT) pH=8.2 s.u.
WINTER (NOV-APRIL) TEMP=10.0 C;
SUMMER (MAY-OCT) TEMP=20.0 C.

CALCULATION OF WATER QUALITY BASED SALTWATER DISCHARGE LIMITS

FACILITY NAME: Brown University - S.O.E. RIPDES PERMIT #: RI0023957

NOTE: METALS CRITERIA ARE DISSOLVED, METALS LIMITS ARE TOTAL; AMMONIA CRITERIA AND LIMITS HAVE BEEN CONVERTED TO ug/l N.

CHEMICAL NAME	CAS #	BACKGROUND CONCENTRATION (ug/L)	SALTWATER CRITERIA ACUTE (ug/L)	DAILY MAX LIMIT (ug/L)	SALTWATER CRITERIA CHRONIC (ug/L)	HUMAN HEALTH NON-CLASS A CRITERIA (ug/L)	MONTHLY AVE LIMIT (ug/L)
PRIORITY POLLUTANTS:							
TOXIC METALS AND CYANIDE							
ANTIMONY	7440360			No Criteria		640	512000
ARSENIC (limits are total recoverable)	7440382	NA	69	55200	36	1.4	1120
ASBESTOS	1332214			No Criteria			No Criteria
BERYLLIUM	7440417			No Criteria			No Criteria
CADMIUM (limits are total recoverable)	7440439	NA	40	32193.15895	8.8		7082.49497
CHROMIUM III (limits are total recoverable)	16065831	NA		No Criteria			No Criteria
CHROMIUM VI (limits are total recoverable)	18540299	NA	1100	886203.424	50		40281.97382
COPPER (limits are total recoverable)	7440508	NA	4.8	4626.506024	3.1		2987.951807
CYANIDE	57125		1	800.00	1	140	800
LEAD (limits are total recoverable)	7439921	NA	210	176656.1514	8.1		6813.880126
MERCURY (limits are total recoverable)	7439976	NA	1.8	1694.117647	0.94	0.15	120
NICKEL (limits are total recoverable)	7440020	NA	74	59797.9798	8.2	4600	6626.262626
SELENIUM (limits are total recoverable)	7782492	NA	290	232464.9299	71	4200	56913.82766
SILVER (limits are total recoverable)	7440224	NA	1.9	1788.235294			No Criteria
THALLIUM	7440280			No Criteria		0.47	376
ZINC (limits are total recoverable)	7440666	NA	90	76109.93658	81	26000	68498.94292
VOLATILE ORGANIC COMPOUNDS							
ACROLEIN	107028			No Criteria		290	232000
ACRYLONITRILE	107131			No Criteria		2.5	2000
BENZENE	71432			No Criteria		510	408000
BROMOFORM	75252			No Criteria		1400	1120000
CARBON TETRACHLORIDE	56235			No Criteria		16	12800
CHLOROBENZENE	108907			No Criteria		1600	1280000
CHLORODIBROMOMETHANE	124481			No Criteria		130	104000
CHLOROFORM	67663			No Criteria		4700	3760000
DICHLOROBROMOMETHANE	75274			No Criteria		170	136000
1,2DICHLOROETHANE	107062			No Criteria		370	296000
1,1DICHLOROETHYLENE	75354			No Criteria		7100	5680000
1,2DICHLOROPROPANE	78875			No Criteria		150	120000
1,3DICHLOROPROPYLENE	542756			No Criteria		21	16800
ETHYLBENZENE	100414			No Criteria		2100	1680000
BROMOMETHANE (methyl bromide)	74839			No Criteria		1500	1200000
CHLOROMETHANE (methyl chloride)	74873			No Criteria			No Criteria
METHYLENE CHLORIDE	75092			No Criteria		5900	4720000

CALCULATION OF WATER QUALITY BASED SALTWATER DISCHARGE LIMITS

FACILITY NAME: Brown University - S.O.E. RIPDES PERMIT #: RI0023957

NOTE: METALS CRITERIA ARE DISSOLVED, METALS LIMITS ARE TOTAL; AMMONIA CRITERIA AND LIMITS HAVE BEEN CONVERTED TO ug/l N.

CHEMICAL NAME	CAS #	BACKGROUND CONCENTRATION (ug/L)	SALTWATER CRITERIA ACUTE (ug/L)	DAILY MAX LIMIT (ug/L)	SALTWATER CRITERIA CHRONIC (ug/L)	HUMAN HEALTH NON-CLASS A CRITERIA (ug/L)	MONTHLY AVE LIMIT (ug/L)
1,1,2,2TETRACHLOROETHANE	79345			No Criteria		40	32000
TETRACHLOROETHYLENE	127184			No Criteria		33	26400
TOLUENE	108883			No Criteria		15000	12000000
1,2TRANSDICHLOROETHYLENE	156605			No Criteria		10000	8000000
1,1,1TRICHLOROETHANE	71556			No Criteria			No Criteria
1,1,2TRICHLOROETHANE	79005			No Criteria		160	128000
TRICHLOROETHYLENE	79016			No Criteria		300	240000
VINYL CHLORIDE	75014			No Criteria		2.4	1920
ACID ORGANIC COMPOUNDS							
2CHLOROPHENOL	95578			No Criteria		150	120000
2,4DICHLOROPHENOL	120832			No Criteria		290	232000
2,4DIMETHYLPHENOL	105679			No Criteria		850	680000
4,6DINITRO2METHYL PHENOL	534521			No Criteria		280	224000
2,4DINITROPHENOL	51285			No Criteria		5300	4240000
4NITROPHENOL	88755			No Criteria			No Criteria
PENTACHLOROPHENOL	87865		13	10400	7.9	30	6320
PHENOL	108952			No Criteria		1700000	999999999
2,4,6TRICHLOROPHENOL	88062			No Criteria		24	19200
BASE NEUTRAL COMPUNDS							
ACENAPHTHENE	83329			No Criteria		990	792000
ANTHRACENE	120127			No Criteria		40000	32000000
BENZIDINE	92875			No Criteria		0.002	1.6
POLYCYCLIC AROMATIC HYDROCARBONS				No Criteria		0.18	144
BIS(2CHLOROETHYL)ETHER	111444			No Criteria		5.3	4240
BIS(2CHLOROISOPROPYL)ETHER	108601			No Criteria		65000	52000000
BIS(2ETHYLHEXYL)PHTHALATE	117817			No Criteria		22	17600
BUTYL BENZYL PHTHALATE	85687			No Criteria		1900	1520000
2CHLORONAPHTHALENE	91587			No Criteria		1600	1280000
1,2DICHLOROBENZENE	95501			No Criteria		1300	1040000
1,3DICHLOROBENZENE	541731			No Criteria		960	768000
1,4DICHLOROBENZENE	106467			No Criteria		190	152000
3,3DICHLOROBENZIDENE	91941			No Criteria		0.28	224
DIETHYL PHTHALATE	84662			No Criteria		44000	35200000
DIMETHYL PHTHALATE	131113			No Criteria		1100000	880000000
DInBUTYL PHTHALATE	84742			No Criteria		4500	3600000
2,4DINITROTOLUENE	121142			No Criteria		34	27200

CALCULATION OF WATER QUALITY BASED SALTWATER DISCHARGE LIMITS

FACILITY NAME: Brown University - S.O.E. RIPDES PERMIT #: RI0023957

NOTE: METALS CRITERIA ARE DISSOLVED, METALS LIMITS ARE TOTAL; AMMONIA CRITERIA AND LIMITS HAVE BEEN CONVERTED TO ug/l N.

CHEMICAL NAME	CAS #	BACKGROUND CONCENTRATION (ug/L)	SALTWATER CRITERIA ACUTE (ug/L)	DAILY MAX LIMIT (ug/L)	SALTWATER CRITERIA CHRONIC (ug/L)	HUMAN HEALTH NON-CLASS A CRITERIA (ug/L)	MONTHLY AVE LIMIT (ug/L)
1,2DIPHENYLHYDRAZINE	122667			No Criteria		2	1600
FLUORANTHENE	206440			No Criteria		140	112000
FLUORENE	86737			No Criteria		5300	4240000
HEXACHLOROBENZENE	118741			No Criteria		0.0029	2.32
HEXACHLOROBUTADIENE	87683			No Criteria		180	144000
HEXACHLOROCYCLOPENTADIENE	77474			No Criteria		1100	880000
HEXACHLOROETHANE	67721			No Criteria		33	26400
ISOPHORONE	78591			No Criteria		9600	7680000
NAPHTHALENE	91203			No Criteria			No Criteria
NITROBENZENE	98953			No Criteria		690	552000
NNITROSODIMETHYLAMINE	62759			No Criteria		30	24000
NNITROSODINPROPYLAMINE	621647			No Criteria		5.1	4080
NNITROSODIPHENYLAMINE	86306			No Criteria		60	48000
PYRENE	129000			No Criteria		4000	3200000
1,2,4trichlorobenzene	120821			No Criteria		70	56000
PESTICIDES/PCBs							
ALDRIN	309002		1.3	1040		0.0005	0.4
Alpha BHC	319846			No Criteria		0.049	39.2
Beta BHC	319857			No Criteria		0.17	136
Gamma BHC (Lindane)	58899		0.16	128		1.8	1440
CHLORDANE	57749		0.09	72	0.004	0.0081	3.2
4,4DDT	50293		0.13	104	0.001	0.0022	0.8
4,4DDE	72559			No Criteria		0.0022	1.76
4,4DDD	72548			No Criteria		0.0031	2.48
DIELDRIN	60571		0.71	568	0.0019	0.00054	0.432
ENDOSULFAN (alpha)	959988		0.034	27.2	0.0087	89	6.96
ENDOSULFAN (beta)	33213659		0.034	27.2	0.0087	89	6.96
ENDOSULFAN (sulfate)	1031078			No Criteria		89	71200
ENDRIN	72208		0.037	29.6	0.0023	0.06	1.84
ENDRIN ALDEHYDE	7421934			No Criteria		0.3	240
HEPTACHLOR	76448		0.053	42.4	0.0036	0.00079	0.632
HEPTACHLOR EPOXIDE	1024573		0.053	42.4	0.0036	0.00039	0.312
POLYCHLORINATED BIPHENYLS3	1336363			No Criteria	0.03	0.00064	0.512
2,3,7,8TCDD (Dioxin)	1746016			No Criteria		0.000000051	0.0000408
TOXAPHENE	8001352		0.21	168	0.0002	0.0028	0.16
TRIBUTYLTIN			0.42	336	0.0074		5.92

CALCULATION OF WATER QUALITY BASED SALTWATER DISCHARGE LIMITS

FACILITY NAME: Brown University - S.O.E. RIPDES PERMIT #: RI0023957

NOTE: METALS CRITERIA ARE DISSOLVED, METALS LIMITS ARE TOTAL; AMMONIA CRITERIA AND LIMITS HAVE BEEN CONVERTED TO ug/l N.

CHEMICAL NAME	CAS #	BACKGROUND CONCENTRATION (ug/L)	SALTWATER CRITERIA ACUTE (ug/L)	DAILY MAX LIMIT (ug/L)	SALTWATER CRITERIA CHRONIC (ug/L)	HUMAN HEALTH NON-CLASS A CRITERIA (ug/L)	MONTHLY AVE LIMIT (ug/L)
NON PRIORITY POLLUTANTS:							
OTHER SUBSTANCES							
ALUMINUM (limits are total recoverable)	7429905	NA		No Criteria			No Criteria
AMMONIA as N (winter/summer)	7664417		4932 3781.2	3945600 3024960	739.8 567.2		591840 453744
4BROMOPHENYL PHENYL ETHER				No Criteria			No Criteria
CHLORIDE	16887006			No Criteria			No Criteria
CHLORINE	7782505		13	13000	7.5		7500
4CHLORO2METHYLPHENOL				No Criteria			No Criteria
1CHLORONAPHTHALENE				No Criteria			No Criteria
4CHLOROPHENOL	106489			No Criteria			No Criteria
2,4DICHLORO6METHYLPHENOL				No Criteria			No Criteria
1,1DICHLOROPROPANE				No Criteria			No Criteria
1,3DICHLOROPROPANE	142289			No Criteria			No Criteria
2,3DINITROTOLUENE				No Criteria			No Criteria
2,4DINITRO6METHYL PHENOL				No Criteria			No Criteria
IRON	7439896			No Criteria			No Criteria
pentachlorobenzene	608935			No Criteria			No Criteria
PENTACHLOROETHANE				No Criteria			No Criteria
1,2,3,5tetrachlorobenzene				No Criteria			No Criteria
1,1,1,2TETRACHLOROETHANE	630206			No Criteria			No Criteria
2,3,4,6TETRACHLOROPHENOL	58902			No Criteria			No Criteria
2,3,5,6TETRACHLOROPHENOL				No Criteria			No Criteria
2,4,5TRICHLOROPHENOL	95954			No Criteria			No Criteria
2,4,6TRINITROPHENOL	88062			No Criteria			No Criteria
XYLENE	1330207			No Criteria			No Criteria

CALCULATION OF WATER QUALITY BASED SALTWATER DISCHARGE LIMITS

FACILITY NAME: Brown University - S.O.E. RIPDES PERMIT #: RI0023957

CHEMICAL NAME	CAS#	DAILY MAX LIMIT (ug/L)	MONTHLY AVE LIMIT (ug/L)
PRIORITY POLLUTANTS			
TOXIC METALS AND CYANIDE			
ANTIMONY	7440360	No Criteria	512000.00
ARSENIC, TOTAL	7440382	55200.00	1120.00
ASBESTOS	1332214	No Criteria	No Criteria
BERYLLIUM	7440417	No Criteria	No Criteria
CADMIUM, TOTAL	7440439	32193.16	7082.49
CHROMIUM III, TOTAL	16065831	No Criteria	No Criteria
CHROMIUM VI, TOTAL	18540299	886203.42	40281.97
COPPER, TOTAL	7440508	4626.51	2987.95
CYANIDE	57125	800.00	800.00
LEAD, TOTAL	7439921	176656.15	6813.88
MERCURY, TOTAL	7439976	1694.12	120.00
NICKEL, TOTAL	7440020	59797.98	6626.26
SELENIUM, TOTAL	7782492	232464.93	56913.83
SILVER, TOTAL	7440224	1788.24	No Criteria
THALLIUM	7440280	No Criteria	376.00
ZINC, TOTAL	7440666	76109.94	68498.94
VOLATILE ORGANIC COMPOUNDS			
ACROLEIN	107028	No Criteria	232000.00
ACRYLONITRILE	107131	No Criteria	2000.00
BENZENE	71432	No Criteria	408000.00
BROMOFORM	75252	No Criteria	1120000.00
CARBON TETRACHLORIDE	56235	No Criteria	12800.00
CHLOROBENZENE	108907	No Criteria	1280000.00
CHLORODIBROMOMETHANE	124481	No Criteria	104000.00
CHLOROFORM	67663	No Criteria	3760000.00
DICHLOROBROMOMETHANE	75274	No Criteria	136000.00
1,2DICHLOROETHANE	107062	No Criteria	296000.00
1,1DICHLOROETHYLENE	75354	No Criteria	5680000.00
1,2DICHLOROPROPANE	78875	No Criteria	120000.00
1,3DICHLOROPROPYLENE	542756	No Criteria	16800.00
ETHYLBENZENE	100414	No Criteria	1680000.00
BROMOMETHANE (methyl bromide)	74839	No Criteria	1200000.00
CHLOROMETHANE (methyl chloride)	74873	No Criteria	No Criteria
METHYLENE CHLORIDE	75092	No Criteria	4720000.00
1,1,2,2TETRACHLOROETHANE	79345	No Criteria	32000.00
TETRACHLOROETHYLENE	127184	No Criteria	26400.00
TOLUENE	108883	No Criteria	12000000.00
1,2TRANSDICHLOROETHYLENE	156605	No Criteria	8000000.00
1,1,1TRICHLOROETHANE	71556	No Criteria	No Criteria
1,1,2TRICHLOROETHANE	79005	No Criteria	128000.00
TRICHLOROETHYLENE	79016	No Criteria	240000.00
VINYL CHLORIDE	75014	No Criteria	1920.00
ACID ORGANIC COMPOUNDS			
2CHLOROPHENOL	95578	No Criteria	120000.00
2,4DICHLOROPHENOL	120832	No Criteria	232000.00
2,4DIMETHYLPHENOL	105679	No Criteria	680000.00
4,6DINITRO2METHYL PHENOL	534521	No Criteria	224000.00
2,4DINITROPHENOL	51285	No Criteria	4240000.00
4NITROPHENOL	88755	No Criteria	No Criteria
PENTACHLOROPHENOL	87865	10400.00	6320.00
PHENOL	108952	No Criteria	999999999.00
2,4,6TRICHLOROPHENOL	88062	No Criteria	19200.00
BASE NEUTRAL COMPUNDS			
ACENAPHTHENE	83329	No Criteria	792000.00
ANTHRACENE	120127	No Criteria	32000000.00
BENZIDINE	92875	No Criteria	1.60
PAHs		No Criteria	144.00
BIS(2CHLOROETHYL)ETHER	111444	No Criteria	4240.00
BIS(2CHLOROISOPROPYL)ETHER	108601	No Criteria	52000000.00
BIS(2ETHYLHEXYL)PHTHALATE	117817	No Criteria	17600.00
BUTYL BENZYL PHTHALATE	85687	No Criteria	1520000.00
2CHLORONAPHTHALENE	91587	No Criteria	1280000.00
1,2DICHLOROBENZENE	95501	No Criteria	1040000.00
1,3DICHLOROBENZENE	541731	No Criteria	768000.00
1,4DICHLOROBENZENE	106467	No Criteria	152000.00
3,3DICHLOROBENZIDENE	91941	No Criteria	224.00
DIETHYL PHTHALATE	84662	No Criteria	35200000.00
DIMETHYL PHTHALATE	131113	No Criteria	880000000.00
DI-n-BUTYL PHTHALATE	84742	No Criteria	3600000.00
2,4DINITROTOLUENE	121142	No Criteria	27200.00
1,2DIPHENYLHYDRAZINE	122667	No Criteria	1600.00
FLUORANTHENE	206440	No Criteria	112000.00

CALCULATION OF WATER QUALITY BASED SALTWATER DISCHARGE LIMITS

FACILITY NAME: Brown University - S.O.E. RIPDES PERMIT #: RI0023957

CHEMICAL NAME	CAS#	DAILY MAX LIMIT (ug/L)	MONTHLY AVE LIMIT (ug/L)
FLUORENE	86737	No Criteria	4240000.00
HEXACHLOROBENZENE	118741	No Criteria	2.32
HEXACHLOROBUTADIENE	87683	No Criteria	144000.00
HEXACHLOROCYCLOPENTADIENE	77474	No Criteria	880000.00
HEXACHLOROETHANE	67721	No Criteria	26400.00
ISOPHORONE	78591	No Criteria	7680000.00
NAPHTHALENE	91203	No Criteria	No Criteria
NITROBENZENE	98953	No Criteria	552000.00
N-NITROSODIMETHYLAMINE	62759	No Criteria	24000.00
N-NITROSODI-N-PROPYLAMINE	621647	No Criteria	4080.00
N-NITROSODIPHENYLAMINE	86306	No Criteria	48000.00
PYRENE	129000	No Criteria	3200000.00
1,2,4trichlorobenzene	120821	No Criteria	56000.00
PESTICIDES/PCBs			
ALDRIN	309002	1040.00	0.40
Alpha BHC	319846	No Criteria	39.20
Beta BHC	319857	No Criteria	136.00
Gamma BHC (Lindane)	58899	128.00	128.00
CHLORDANE	57749	72.00	3.20
4,4DDT	50293	104.00	0.80
4,4DDE	72559	No Criteria	1.76
4,4DDD	72548	No Criteria	2.48
DIELDRIN	60571	568.00	0.43
ENDOSULFAN (alpha)	959988	27.20	6.96
ENDOSULFAN (beta)	33213659	27.20	6.96
ENDOSULFAN (sulfate)	1031078	No Criteria	71200.00
ENDRIN	72208	29.60	1.84
ENDRIN ALDEHYDE	7421934	No Criteria	240.00
HEPTACHLOR	76448	42.40	0.63
HEPTACHLOR EPOXIDE	1024573	42.40	0.31
POLYCHLORINATED BIPHENYLS3	1336363	No Criteria	0.51
2,3,7,8TCDD (Dioxin)	1746016	No Criteria	0.00
TOXAPHENE	8001352	168.00	0.16
TRIBUTYLTIN		336.00	5.92

CHEMICAL NAME	CAS#	DAILY MAX LIMIT (ug/L)	MONTHLY AVE LIMIT (ug/L)
NON PRIORITY POLLUTANTS			
OTHER SUBSTANCES			
ALUMINUM, TOTAL	7429905	No Criteria	No Criteria
AMMONIA (as N), WINTER (NOV-APR	7664417	3945600.00	591840.00
AMMONIA (as N), SUMMER (MAY-OC	7664417	3024960.00	453744.00
4BROMOPHENYL PHENYL ETHER		No Criteria	No Criteria
CHLORIDE	16887006	No Criteria	No Criteria
CHLORINE	7782505	13000.00	7500.00
4CHLORO2METHYLPHENOL		No Criteria	No Criteria
1CHLORONAPHTHALENE		No Criteria	No Criteria
4CHLOROPHENOL	106489	No Criteria	No Criteria
2,4DICHLORO6METHYLPHENOL		No Criteria	No Criteria
1,1DICHLOROPROPANE		No Criteria	No Criteria
1,3DICHLOROPROPANE	142289	No Criteria	No Criteria
2,3DINITROTOLUENE		No Criteria	No Criteria
2,4DINITRO6METHYL PHENOL		No Criteria	No Criteria
IRON	7439896	No Criteria	No Criteria
pentachlorobenzene	608935	No Criteria	No Criteria
PENTACHLOROETHANE		No Criteria	No Criteria
1,2,3,5tetrachlorobenzene		No Criteria	No Criteria
1,1,1,2TETRACHLOROETHANE	630206	No Criteria	No Criteria
2,3,4,6TETRACHLOROPHENOL	58902	No Criteria	No Criteria
2,3,5,6TETRACHLOROPHENOL		No Criteria	No Criteria
2,4,5TRICHLOROPHENOL	95954	No Criteria	No Criteria
2,4,6TRINITROPHENOL	88062	No Criteria	No Criteria
XYLENE	1330207	No Criteria	No Criteria

Facility Name: ***Brown University - School of Engineering Buildings***
RIPDES Permit #: ***RI0023957***
Outfall #: ***001***

NOTE: METALS LIMITS ARE TOTAL METALS

Parameter	CAS #	Concentration Limits (ug/L) Based on WQ Criteria		Antideg. Limits (ug/L)	Groundwater Lab Results (ug/L) 7/7/1905	Potential WQ Based Permit Limits (ug/L)		Applicable Remediation General Permit Limits (ug/l)		Reasonable Potential (Yes/No)
		Daily Max	Monthly Ave	Monthly Ave	Max Values	Daily Max	Monthly Ave	Daily Max	Monthly Ave	
PRIORITY POLLUTANTS										
TOXIC METALS AND CYANIDE										
ANTIMONY	7440360	No Criteria	512000.00	—	<2.5	—	512000	N/A	N/A	No
ARSENIC, TOTAL	7440382	55200.00	1120.00	—	12	55200	1120	N/A	N/A	No
ASBESTOS	1332214	No Criteria	No Criteria	—	—	—	—	N/A	N/A	—
BERYLLIUM	7440417	No Criteria	No Criteria	—	<0.5	—	—	N/A	N/A	No
CADMIUM, TOTAL	7440439	32193.16	7082.49	—	<2.0	32193.15895	7082.49497	N/A	N/A	No
CHROMIUM III, TOTAL	16065831	No Criteria	No Criteria	—	26	—	—	N/A	N/A	No
CHROMIUM VI, TOTAL	18540299	886203.42	40281.97	—	23	886203.424	40281.97382	N/A	N/A	No
COPPER, TOTAL	7440508	4626.51	2987.95	—	37	4626.506024	2987.951807	N/A	N/A	No
CYANIDE	57125	800.00	800.00	—	9.5	800	800	N/A	N/A	No
LEAD, TOTAL	7439921	176656.15	6813.88	—	21	176656.1514	6813.880126	N/A	N/A	No
MERCURY, TOTAL	7439976	1694.12	120.00	—	<0.2	1694.117647	120	N/A	N/A	No
NICKEL, TOTAL	7440020	59797.98	6626.26	—	53	59797.9798	6626.262626	N/A	N/A	No
SELENIUM, TOTAL	7782492	232464.93	56913.83	—	7.5	232464.9299	56913.82766	N/A	N/A	No
SILVER, TOTAL	7440224	1788.24	1788.24	—	2.1	1788.235294	1788.235294	N/A	N/A	No
THALLIUM	7440280	No Criteria	376.00	—	<1	—	376	N/A	N/A	No
ZINC, TOTAL	7440666	76109.94	68498.94	—	72	76109.93658	68498.94292	N/A	N/A	No
VOLATILE ORGANIC COMPOUNDS										
ACROLEIN	107028	No Criteria	232000.00	—	—	—	232000	—	—	—
ACRYLONITRILE	107131	No Criteria	2000.00	—	—	—	2000	—	—	—
BENZENE	71432	No Criteria	408000.00	—	<1	—	408000	5	5	No
BROMOFORM	75252	No Criteria	1120000.00	—	—	—	1120000	—	—	—
CARBON TETRACHLORIDE	56235	No Criteria	12800.00	—	—	—	12800	—	—	—
CHLOROBENZENE	108907	No Criteria	1280000.00	—	—	—	1280000	—	—	—
CHLORODIBROMOMETHANE	124481	No Criteria	104000.00	—	—	—	104000	—	—	—
CHLOROFORM	67663	No Criteria	3760000.00	—	—	—	3760000	—	—	—
DICHLOROBROMOMETHANE	75274	No Criteria	136000.00	—	—	—	136000	—	—	—
1,2DICHLOROETHANE	107062	No Criteria	296000.00	—	<1	—	296000	—	—	No
1,1DICHLOROETHYLENE	75354	No Criteria	5680000.00	—	<1	—	5680000	3.2	3.2	No
1,2DICHLOROPROPANE	78875	No Criteria	120000.00	—	—	—	120000	—	—	—
1,3DICHLOROPROPYLENE	542756	No Criteria	16800.00	—	—	—	16800	—	—	—
ETHYLBENZENE	100414	No Criteria	1680000.00	—	<1	—	1680000	—	1680	No
BROMOMETHANE (methyl bromide)	74839	No Criteria	1200000.00	—	—	—	1200000	—	—	—
CHLOROMETHANE (methyl chloride)	74873	No Criteria	No Criteria	—	—	—	—	—	—	—
METHYLENE CHLORIDE	75092	No Criteria	4720000.00	—	—	—	4720000	—	—	—
1,1,2,2TETRACHLOROETHANE	79345	No Criteria	32000.00	—	—	—	32000	—	—	—
FLUORENE	86737	No Criteria	4240000.00	—	<0.1	—	4240000	4240	—	No
HEXACHLOROBENZENE	118741	No Criteria	2.32	—	—	—	2.32	—	—	—
HEXACHLOROBUTADIENE	87683	No Criteria	144000.00	—	—	—	144000	—	—	—
HEXACHLOROCYCLOPENTADIENE	77474	No Criteria	880000.00	—	—	—	880000	—	—	—
HEXACHLOROETHANE	67721	No Criteria	26400.00	—	—	—	26400	—	—	—
ISOPHORONE	78591	No Criteria	7680000.00	—	—	—	7680000	—	—	—
NAPHTHALENE	91203	No Criteria	No Criteria	—	<0.1	—	—	20	—	No
NITROBENZENE	98953	No Criteria	552000.00	—	—	—	552000	—	—	—
N-NITROSODIMETHYLAMINE	62759	No Criteria	24000.00	—	—	—	24000	—	—	—
N-NITROSODI-N-PROPYLAMINE	621647	No Criteria	4080.00	—	—	—	4080	—	—	—
N-NITROSODIPHENYLAMINE	86306	No Criteria	48000.00	—	—	—	48000	—	—	—
PYRENE	129000	No Criteria	3200000.00	—	<0.1	—	3200000	—	3200	No
1,2,4trichlorobenzene	120821	No Criteria	56000.00	—	—	—	56000	—	—	—
PESTICIDES/PCBs										
ALDRIN	309002	1040.00	0.40	—	—	1040	0.4	—	—	—
Alpha BHC	319846	No Criteria	39.20	—	—	—	39.2	—	—	—

Facility Name: ***Brown University - School of Engineering Buildings***
RIPDES Permit #: ***RI0023957***
Outfall #: ***001***

NOTE: METALS LIMITS ARE TOTAL METALS

Parameter	CAS #	Concentration Limits (ug/L) Based on WQ Criteria		Antideg. Limits (ug/L)	Groundwater Lab Results (ug/L) 7/7/1905	Potential WQ Based Permit Limits (ug/L)		Applicable Remediation General Permit Limits (ug/l)		Reasonable Potential (Yes/No)
		Daily Max	Monthly Ave	Monthly Ave	Max Values	Daily Max	Monthly Ave	Daily Max	Monthly Ave	
Beta BHC	319857	No Criteria	136.00	—	—	—	136	—	—	—
Gamma BHC (Lindane)	58899	128.00	128.00	—	—	128	128	—	—	—
CHLORDANE	57749	72.00	3.20	—	—	72	3.2	—	—	—
4,4DDT	50293	104.00	0.80	—	—	104	0.8	—	—	—
4,4DDE	72559	No Criteria	1.76	—	—	—	1.76	—	—	—
4,4DDD	72548	No Criteria	2.48	—	—	—	2.48	—	—	—
DIELDRIN	60571	568.00	0.43	—	—	568	0.432	—	—	—
ENDOSULFAN (alpha)	959988	27.20	6.96	—	—	27.2	6.96	—	—	—
ENDOSULFAN (beta)	33213659	27.20	6.96	—	—	27.2	6.96	—	—	—
ENDOSULFAN (sulfate)	1031078	No Criteria	71200.00	—	—	—	71200	—	—	—
ENDRIN	72208	29.60	1.84	—	—	29.6	1.84	—	—	—
ENDRIN ALDEHYDE	7421934	No Criteria	240.00	—	—	—	240	—	—	—
HEPTACHLOR	76448	42.40	0.63	—	—	42.4	0.632	—	—	—
HEPTACHLOR EPOXIDE	1024573	42.40	0.31	—	—	42.4	0.312	—	—	—
POLYCHLORINATED BIPHENYLS3	1336363	No Criteria	0.51	—	—	—	0.512	—	—	—
2,3,7,8TCDD (Dioxin)	1746016	No Criteria	0.00	—	—	—	0.0000408	—	—	—
TOXAPHENE	8001352	168.00	0.16	—	—	168	0.16	—	—	—
TRIBUTYLTIN		336.00	5.92	—	—	336	5.92	—	—	—
TETRACHLOROETHYLENE	127184	No Criteria	26400.00	—	—	—	26400	—	—	—
TOLUENE	108883	No Criteria	12000000.00	—	<1	—	12000000	—	12,000	No
1,2TRANSDICHLOROETHYLENE	156605	No Criteria	8000000.00	—	—	—	8000000	—	—	—
1,1,1TRICHLOROETHANE	71556	No Criteria	No Criteria	—	<1	—	—	200	—	No
1,1,2TRICHLOROETHANE	79005	No Criteria	128000.00	—	<1	—	128000	5	5	No
TRICHLOROETHYLENE	79016	No Criteria	240000.00	—	<1	—	240000	5	5	No
VINYL CHLORIDE	75014	No Criteria	1920.00	—	<1	—	1920	2	1.92	No
ACID ORGANIC COMPOUNDS										
2CHLOROPHENOL	95578	No Criteria	120000.00	—	—	—	120000	—	—	—
2,4DICHLOROPHENOL	120832	No Criteria	232000.00	—	—	—	232000	—	—	—
2,4DIMETHYLPHENOL	105679	No Criteria	680000.00	—	—	—	680000	—	—	—
4,6DINITRO2METHYL PHENOL	534521	No Criteria	224000.00	—	—	—	224000	—	—	—
2,4DINITROPHENOL	51285	No Criteria	4240000.00	—	—	—	4240000	—	—	—
4NITROPHENOL	88755	No Criteria	No Criteria	—	—	—	—	—	—	—
PENTACHLOROPHENOL	87865	10400.00	6320.00	—	<0.84	10400	6320	1	1	No
PHENOL	108952	No Criteria	999999999.00	—	<100	—	999999999	300	300	No
2,4,6TRICHLOROPHENOL	88062	No Criteria	19200.00	—	—	—	19200	—	—	—
BASE NEUTRAL COMPUNDS										
ACENAPHTHENE	83329	No Criteria	792000.00	—	<0.1	—	792000	1.9	1.9	No
ANTHRACENE	120127	No Criteria	32000000.00	—	<0.1	—	32000000	—	32000	No
BENZIDINE	92875	No Criteria	1.60	—	—	—	1.6	—	—	—
PAHs		No Criteria	144.00	—	—	—	144	—	—	—
BIS(2CHLOROETHYL)ETHER	111444	No Criteria	4240.00	—	—	—	4240	—	—	—
BIS(2CHLOROISOPROPYL)ETHER	108601	No Criteria	52000000.00	—	—	—	52000000	—	—	—
BIS(2ETHYLHEXYL)PHTHALATE	117817	No Criteria	17600.00	—	4.6	—	17600	6	6	Yes, Apply RGP Limit
BUTYL BENZYL PHTHALATE	85687	No Criteria	1520000.00	—	—	—	1520000	—	—	—
2CHLORONAPHTHALENE	91587	No Criteria	1280000.00	—	—	—	1280000	—	—	—
1,2DICHLOROBENZENE	95501	No Criteria	1040000.00	—	<1	—	1040000	—	—	No
1,3DICHLOROBENZENE	541731	No Criteria	768000.00	—	<1	—	768000	—	—	No
1,4DICHLOROBENZENE	106467	No Criteria	152000.00	—	<1	—	152000	—	—	No
3,3DICHLOROBENZIDENE	91941	No Criteria	224.00	—	—	—	224	—	—	—
DIETHYL PHTHALATE	84662	No Criteria	35200000.00	—	—	—	35200000	—	—	—
DIMETHYL PHTHALATE	131113	No Criteria	880000000.00	—	—	—	880000000	—	—	—
DI-n-BUTYL PHTHALATE	84742	No Criteria	3600000.00	—	—	—	3600000	—	—	—
2,4DINITROTOLUENE	121142	No Criteria	27200.00	—	—	—	27200	—	—	—

Facility Name: ***Brown University - School of Engineering Buildings***

RIPDES Permit #: ***RI0023957***

Outfall #: ***001***

NOTE: METALS LIMITS ARE TOTAL METALS

Parameter	CAS #	Concentration Limits (ug/L) Based on WQ Criteria		Antideg. Limits (ug/L)	Groundwater Lab Results (ug/L) 7/7/1905	Potential WQ Based Permit Limits (ug/L)		Applicable Remediation General Permit Limits (ug/l)		Reasonable Potential (Yes/No)
		Daily Max	Monthly Ave	Monthly Ave	Max Values	Daily Max	Monthly Ave	Daily Max	Monthly Ave	
1,2DIPHENYLHYDRAZINE	122667	No Criteria	1600.00	—	—	—	1600	—	—	—
FLUORANTHENE	206440	No Criteria	112000.00	—	—	—	112000	—	—	—
NON PRIORITY POLLUTANTS										
OTHER SUBSTANCES										
ALUMINUM, TOTAL	7429905	No Criteria	No Criteria	—	—	—	—	—	—	—
AMMONIA (as N), WINTER (NOV-APR)	7664417	3945600.00	591840.00	—	—	3945600	591840	—	—	—
AMMONIA (as N), SUMMER (MAY-OCT)	7664417	3024960.00	453744.00	—	—	3024960	453744	—	—	—
4BROMOPHENYL PHENYL ETHER		No Criteria	No Criteria	—	—	—	—	—	—	—
CHLORIDE	16887006	No Criteria	No Criteria	—	—	—	—	—	—	—
CHLORINE	7782505	13000.00	7500.00	—	<20	13000	7500	13	7.5	No
4CHLORO2METHYLPHENOL		No Criteria	No Criteria	—	—	—	—	—	—	—
1CHLORONAPHTHALENE		No Criteria	No Criteria	—	—	—	—	—	—	—
4CHLOROPHENOL	106489	No Criteria	No Criteria	—	—	—	—	—	—	—
2,4DICHLORO6METHYLPHENOL		No Criteria	No Criteria	—	—	—	—	—	—	—
1,1DICHLOROPROPANE		No Criteria	No Criteria	—	—	—	—	—	—	—
1,3DICHLOROPROPANE	142289	No Criteria	No Criteria	—	—	—	—	—	—	—
2,3DINITROTOLUENE		No Criteria	No Criteria	—	—	—	—	—	—	—
2,4DINITRO6METHYL PHENOL		No Criteria	No Criteria	—	—	—	—	—	—	—
IRON	7439896	No Criteria	No Criteria	—	38,400	—	—	1000	—	No
pentachlorobenzene	608935	No Criteria	No Criteria	—	—	—	—	—	—	—
PENTACHLOROETHANE		No Criteria	No Criteria	—	—	—	—	—	—	—
1,2,3,5tetrachlorobenzene		No Criteria	No Criteria	—	—	—	—	—	—	—
1,1,1,2TETRACHLOROETHANE	630206	No Criteria	No Criteria	—	—	—	—	—	—	—
2,3,4,6TETRACHLOROPHENOL	58902	No Criteria	No Criteria	—	—	—	—	—	—	—
2,3,5,6TETRACHLOROPHENOL		No Criteria	No Criteria	—	—	—	—	—	—	—
2,4,5TRICHLOROPHENOL	95954	No Criteria	No Criteria	—	—	—	—	—	—	—
2,4,6TRINITROPHENOL	88062	No Criteria	No Criteria	—	—	—	—	—	—	—
XYLENE	1330207	No Criteria	No Criteria	—	<2	—	—	—	—	—
NON WQ BASED PARAMETERS										
TPH (8100) (ug/l)	—	No Criteria	No Criteria	—	<100	—	—	1000	—	No
TPH (as Oil & Grease) (ug/l)	—	No Criteria	No Criteria	—	7,000	—	—	—	—	—
TSS (ug/l)	—	No Criteria	No Criteria	—	2,200,000	—	—	30,000	—	Yes, Apply RGP Limit
FLOW (gpm)	—	No Criteria	No Criteria	—	—	—	—	—	—	—